Datasheet

Explosion-proof Electromagnetic Flowmeter

SUP-FMX470

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The electromagnetic flowmeter is designed based on the Faraday electromagnetic induction principle and used to measure the instantaneous flow rate of conductive liquids in enclosed pipelines in flammable and explosive environments. During on-site monitoring and display, standard current signals, pulse signals, and RS485 digital signals can be output for recording, adjustment, and control, achieving automatic detection and control. It can be widely used in industries such as tap water, chemical industry, coal, environmental protection, light textile, metallurgy, papermaking, etc.

Features

- Passed various universal explosion-proof (Ex) certifications.
- Reliable measurement, high accuracy, and good stability.
- Integrated structure, no moving parts, easy to install, maintenance free.
- RS485 communication interface - standard Modbus RTU protocol.
- It is not affected by the direction of the fluid and can be accurately measured in both directions.
- Adopting advanced low-frequency square wave excitation, zero point stability,strong anti-interference ability, and reliable operation.
- Touch the button, no need to open the lid operation.
- The orientation of the header/display interface can be adjusted for easy reading.
- Built in bilingual Chinese and English, allowing for free switching.

Explosion-proof Electromagnetic Flowmeter

Principle

The operating principle of electromagnetic flowmeter is based on Faraday's law of electromagnetic induction. The two electromagnetic coils at the upper and lower ends as shown in Figure 1 generate a constant or alternating magnetic field. When the conductive medium flows through the electromagnetic flowmeter, the induced electromotive force can be detected between the left and right electrodes on the wall of the flowmeter tube. The magnitude of the induced electromotive force is proportional to the electrically conductive medium flow rate, the magnetic induction density of the magnetic field, and the width of the conductor (the inner diameter of the flowmeter measuring tube), and the flow rate of the medium can be obtained by calculation. The induced electromotive force equation is as follows:

$$E = K \times B \times V \times D$$

Where: E—Induced electromotive force

K—Meter constant

B—Magnetic induction density

V—Average flow speed in cross-section of measuring tube

D—Inner diameter of measuring tube

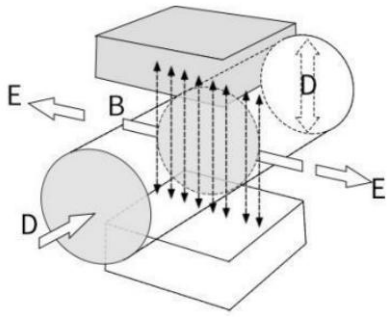
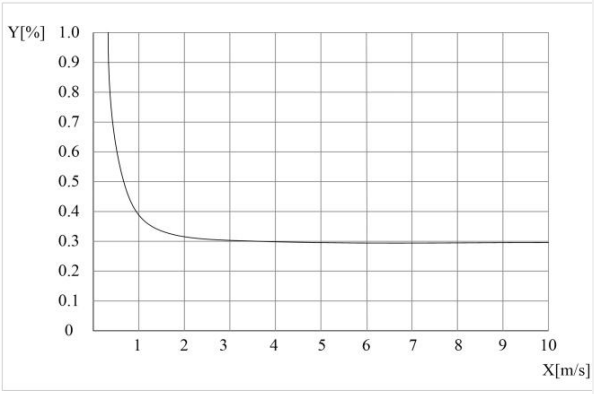


Figure 1

To ensure accurate measurement, the fluid must have conductivity above a minimum threshold. The induced voltage is captured by the electrodes and transmitted to the converter, where it is processed and displayed as real-time and total flow.

Parameters			
Input			
Measured variable	Direct measured variables ： Flow velocity Calculated measured variables ： Volume flow , mass flow.		
Velocity of flow	Typically Velocity of flow：0.5m/s~5m/s		
Nominal diameter	DN15~DN300		
Flow range	Nominal diameter	Min value (m^3/h)	Max value (m^3/h)
	DN15	0.32	3.2
	DN20	0.56	5.6
	DN25	0.88	8.8
	DN32	1.4	14
	DN40	2.3	23
	DN50	3.5	35
	DN65	6	60
	DN80	9	90
	DN100	14	140
	DN125	22	220
	DN150	32	320
	DN200	56	560
	DN250	88	880
	DN300	127	1270
Range ratio	1:10		
Output			
Current output	Function	Measurement of volume and quality (in the case of constant density)	
	Setting	Scope	(4~20)mA
		Max	20mA
		Min	4mA
	Internal voltage	24VDC	
	Loading	≤750Ω	
Pulse output	Function	Set up Pulse output	
	Pulse output	Basis	Fmax ≤ 5000 cp/s Output pulse width: 0.1ms ~2000ms (This value is lower than the maximum duty cycle, with a maximum duty cycle of 1:1 Fmax ≤ 5000 cp/s)
		Pulse coefficient	0.001~100000/unit
	Passive	U_{Outer}≤ 30VDC	
	Active	$U_{Internal}$ ≤ 24VDC	
		I≤ 4.52mA	
Communications	RS485 serial , MODBUS-RTU communication protocol		

Power supply	
Supply voltage	100VAC~230VAC，50/60Hz； 20VDC~28VDC
Power consumption	≤15W
Terminals	Screw type terminal block, maximum wire diameter 2.5mm^2
Cable entries	M20*1.5 or NPT1/2
Performance characteristics	
Reference operating conditions	Medium: water Temperature: 20℃ Pressure: 0.1MPa Stallation requirements: Inlet run≥10DN, Outlet run≥5DN
Accuracy	Measurement value±0.5%(Flow velocity 0.5m/s~5m/s)
Repetitiveness	0.16%
Maximum measured error	 ①X[m/s]：Velocity of flow ②Y[%]：Actual measured value deviation
Process	
Medium temperature range	Polyurethane rubber (PU)：-10℃~60℃ Chloroprene rubber (CR)：-10℃~70℃ PTFE/FEP：-10℃~120℃
Pressure rating (High pressure can be customized)	DN15~DN250：PN<1.6MPa DN300：PN<1.0MPa Note：(If there are differences in the selection of individual specifications, the label shall prevail, and high-voltage can be customized)
Conductivity	≥50μS/cm
Environment	
Ambient temperature	-10℃~55℃
Storage temperature	-20℃~55℃
Ingress protection	IP65
Explosion-proof parameters	
Ex symbol	Ex db ib IIC T6...T4 Gb Note: The product is a flameproof intrinsic safety composite explosion-proof type. The product header is designed with explosion-proof structure, the sensor measuring electrode part is designed with intrinsic safety, and the intrinsic safety circuit is an internal circuit with no external output.

Temp group	Lining material	Medium temperature [℃]		
		T6[85℃]	T5[100℃]	T4[135℃]
	PU	-10~60	-10~60	-10~60
	CR	-10~60	-10~70	-10~70
	PTFE、FEP	-10~60	-10~75	-10~120
	Note: During the installation and use of the product, corresponding measures should be taken to ensure that the temperature at the neck of the sensor does not exceed 75℃.			
Cable introduction Installation Requirements	During product installation and use, it is necessary to select or prepare cable entry devices that comply with the requirements of GB/T 3836.1-2021 and GB/T 3836.2-2021 standards and bear the explosion-proof marking Ex db IIC Gb.			

Wiring

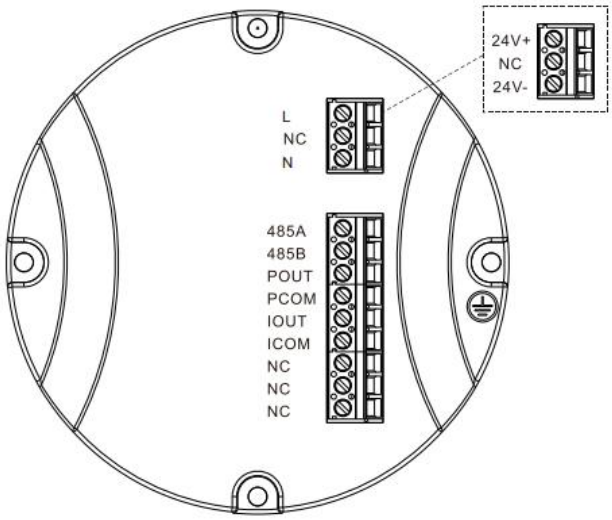


Figure 2 Terminal schematic diagram

Table 1 Terminal Description

Terminal	Description
L，N	100VAC~230VAC，50/60Hz；
24V+、24V-	20VDC~28VDC
485A，485B	RS485 serial communication
IOUT，ICOM	(4~20)mA output
POUT，PCOM	Pulse output
⏚	Converter instrument protection grounding

Dimension

Converter dimensions

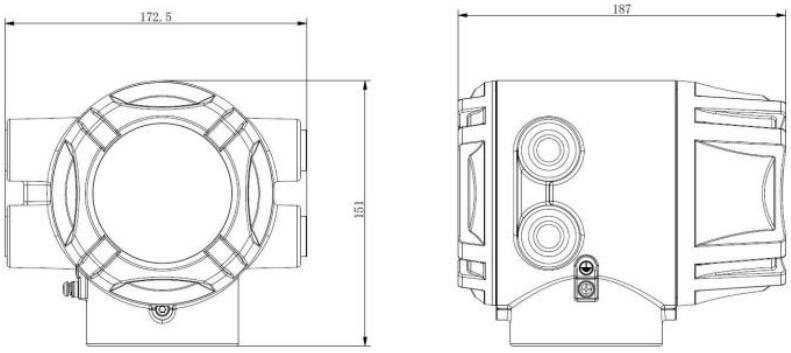


Figure 3 Converter dimensions (Unit: mm)

Sensor dimensions

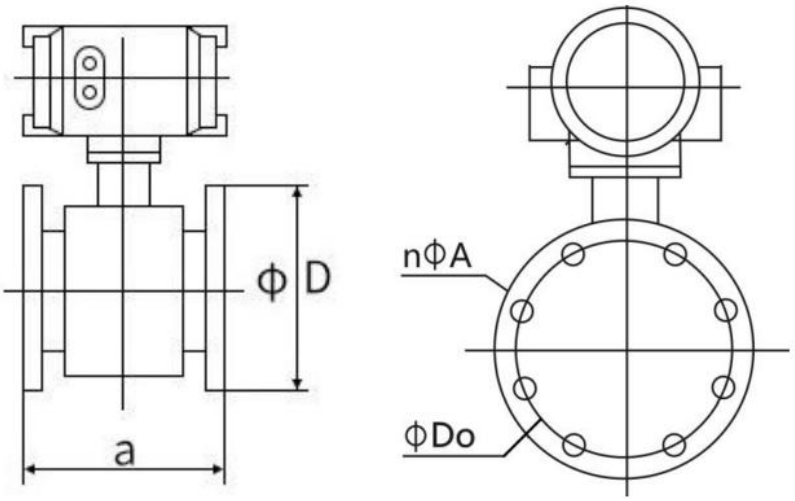


Figure 4 Sensor appearance diagram

Table 2 Sensor dimensions

DN	a	D	Do	n*A	Pressure resistance
15	200	95	65	4*14	1.6MPa
20	200	105	75	4*14	1.6MPa
25	200	115	85	4*14	1.6MPa
32	200	140	100	4*18	1.6MPa
40	200	150	110	4*18	1.6MPa
50	200	165	125	4*18	1.6MPa
65	200	185	145	4*18	1.6MPa
80	200	200	160	8*18	1.6MPa
100	250	220	180	8*18	1.6MPa
125	250	250	210	8*18	1.6MPa
150	300	285	240	8*22	1.6MPa
200	350	340	295	12*22	1.6MPa
250	450	405	355	12*26	1.6MPa
300	500	445	400	12*22	1.0MPa

Ordering code

SUP-FMX470 -15-J-B-MC-K-AA-M3-N6-WA										Description
SUP-FMX470	-	-	-	-	-	-	-	-	-	
Nominal Diameter	15									DN15(1/2")
	20									DN20(3/4")
	25									DN25(1")
	32									DN32(1.25")
	40									DN40(1.5")
	50									DN50(2")
	65									DN65(2.5")
	80									DN80(3")
	1C									DN100(4")
	1E									DN125(5")
	1G									DN150(6")
	2C									DN200(8")
	2G									DN250(10")
	3C									DN300(12")
Process Connection Standard		J								JB/T 81 Flange
		D								GB/T9124 Flange
		H								HG/T 20592 Flange
		XX								Other
Nominal Pressure			B							PN10
			C							PN16
			XX							Other
Process Connection and Body Material				MC						Carbon Steel
				M1						304SS
				XX						Other
Accuracy					K					0.5 Class
Output and Power Supply						AA				4-20mA+Pulse+RS485, 220VAC
						AM				4-20mA+Pulse+RS485, 24VDC
Electrode Material							M3			316LSS
							MF			Hastelloy B
							MG			Hastelloy C
							T1			Titanium
							T2			Tantalum
							MH			Platinum-Iridium Alloy
Lining Material								N6		Polytetrafluoroethylene (PTFE)
								N1		Chloroprene Rubber
								N2		Polyurethane (PU)

N7		Perfluoroalkoxy Alkane (PFA / F46)
Electrical Interface, Housing Material, and Protection Rating	WA	Integrated Type,M20*1.5 Cable Gland,Aluminum Alloy,IP65
	W7	Integrated Type,NPT1/2 Cable Gland,Aluminum Alloy,IP65